

SOLAR OBSERVATIONS

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SOLAR RADIATION OBSERVATIONS, AUGUST 1938

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Measurements of solar radiant energy received at the surface of the earth are made at eight stations maintained by the Weather Bureau, and at nine cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Washington, D. C., Madison, Wis., Lincoln, Nebr.) and at the Blue Hill Observatory of Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau stations at Washington and Madison.

The geographic coordinates of the stations, and descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data, obtained up to the end of 1936, will be found in the MONTHLY WEATHER REVIEW, December 1937, pages 415 to 441; further descriptions of instruments and methods are given in Weather Bureau Circular Q.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parenthesis). At Madison and Lincoln the observations are made with the Marvin pyrheliometer; at Washington and Blue Hill they are obtained with a recording thermopile, checked by observations with a Marvin pyrheliometer at Washington and with a Smithsonian silver disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 8 a. m. (75th meridian time) and at noon (local mean solar time).

During August 1938 normal incidence intensities averaged above normal at Madison and very close to normal at Lincoln. No measurements of this character were made at Washington.

Table 2 contains the average amounts of radiation received daily on a horizontal surface from both sun and sky during each week, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the records of the Eppley pyrheliometer recording on either a microammeter or a potentiometer.

During August all stations showed an excess in the total solar and sky radiation with the exception of Fairbanks, Riverside, and Friday Harbor.

Polarization measurements made at Madison on 6 days give a mean of 56.2 percent with a maximum of 63 percent on the 12th. The mean value is close to the August normal, but the maximum value is appreciably lower than the normal for the month.

TABLE 1.—Solar radiation intensities during August 1938

[Gram-calories per minute per square centimeter of normal surface]

MADISON, WIS.

Date	Sun's zenith distance										Local mean solar time
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	
	75th mer. time	Air mass									
		A. M.					P. M.				
e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e	
Aug. 1-----	mm. 14.10		cal. 0.64	cal. 0.79	cal. 1.00	cal. 1.24				mm. 16.20	
Aug. 2-----	16.20	0.60	.72	.82						17.37	
Aug. 4-----	12.24	.78	.92	1.05	1.23	1.44				11.81	
Aug. 11-----	12.68	.89		1.14	1.28	1.46				11.38	
Aug. 12-----	12.24	.94	1.00	1.15	1.31	1.48				11.38	
Aug. 13-----	13.61	.74	.88	1.00	1.16					18.59	
Aug. 17-----	12.24			1.06	1.24	1.39				13.61	
Means-----		.79	.83	1.00	1.20	1.40					
Departures---		+ .06	+ .03	+ .07	+ .10	+ .07					

LINCOLN, NEBR.

Aug. 2.....	15.65	-----	-----	0.91	1.11	1.35	1.03	-----	-----	-----	13.13
Aug. 5.....	17.96	-----	-----	-----	1.11	1.35	.99	-----	-----	-----	16.20
Aug. 6.....	15.65	-----	-----	-----	1.06	1.33	1.03	-----	-----	-----	14.10
Aug. 9.....	16.20	-----	-----	-----	-----	1.37	1.12	-----	-----	-----	15.11
Aug. 11.....	10.97	0.80	0.90	1.04	1.25	1.47	1.21	-----	-----	-----	9.14
Aug. 12.....	9.14	.82	.92	1.09	1.28	1.50	1.18	-----	-----	-----	10.21
Aug. 13.....	14.10	-----	-----	.94	1.16	1.36	-----	-----	-----	-----	14.10
Aug. 16.....	16.20	-----	-----	-----	-----	-----	1.18	-----	-----	-----	14.60
Aug. 17.....	16.79	.78	.90	1.03	1.24	1.45	-----	-----	-----	-----	14.10
Aug. 18.....	16.79	.60	-----	-----	1.01	-----	-----	-----	-----	-----	19.89
Aug. 19.....	14.10	.70	.80	.99	1.18	1.37	.98	0.70	-----	-----	13.61
Aug. 22.....	17.37	.44	.55	.76	1.01	1.23	1.04	-----	-----	-----	17.37
Aug. 23.....	13.13	-----	-----	.83	1.06	1.28	.89	.61	-----	-----	12.24
Aug. 24.....	12.24	.45	.58	.70	.92	-----	.78	.58	-----	-----	16.20
Aug. 25.....	13.13	-----	-----	.79	1.02	1.38	-----	-----	-----	-----	15.65
Aug. 30.....	15.11	.54	.61	.77	1.00	-----	.96	-----	-----	-----	15.11
Means.....	-----	.66	.75	.90	1.09	1.36	1.03	.63	-----	-----	-----
Departures.....	-----	-.02	-.03	-.01	.00	+ .04	-.04	-.25	-----	-----	-----

* Interpolated.

TABLE 2.—Average daily totals of solar radiation (direct+diffuse) received on a horizontal surface

Week beginning—	Gram-calories per square centimeter															
	Wash- ington	Madison	Lin- coln	Chica- go	New York	Fresno	Fair- banks	Twin Falls	La Jolla	New Orleans	River- side	Blue Hill	San Juan	Friday Harbor	Ithaca	New- port
July 30.....	468	509	589	505	439	697	337	622	494	393	524	562	664	621	464	559
Aug. 6.....	417	479	517	449	407	684	348	594	512	422	501	448	584	556	473	461
Aug. 13.....	520	491	498	498	462	675	298	609	576	557	480	587	665	478	420	480
Aug. 20.....	516	489	489	514	508	600	206	536	547	574	499	530	538	510	488	597
Aug. 27.....	430	489	416	-----	454	573	201	447	482	513	452	496	612	369	426	502
Departures of daily totals from normals																
July 30.....	-5	+38	+67	+108	+8	+30	-18	+71	-58	-67	-52	+24	+110	+67	+14	-----
Aug. 6.....	-21	+21	+15	+52	+73	+44	+33	+43	-8	-25	-36	-37	+73	+20	+43	-----
Aug. 13.....	+77	+46	+4	+93	+80	+47	+4	+110	+105	+129	-55	+60	+148	-50	-16	-----
Aug. 20.....	+103	+45	0	+103	+176	+5	-67	+6	+24	+142	-17	+17	0	+14	+72	-----
Aug. 27.....	+12	+61	-31	-----	+98	-4	-38	-39	+26	+68	-32	+81	+65	-67	+52	-----
Accumulated departures since Jan. 1																
	-9,524	-868	-861	+6,587	+2,121	-924	+4,207	-6,139	-3,017	+5,012	-5,642	-2,882	+11,233	+7,938	+1,841	-----